Title

SILBUS

REPEATER

TYPE SILBUS-A2WCCT2

USER'S MANUAL

Document Number

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Issue

01

REVISION CONTROL

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1 GENERAL DESCRIPTION

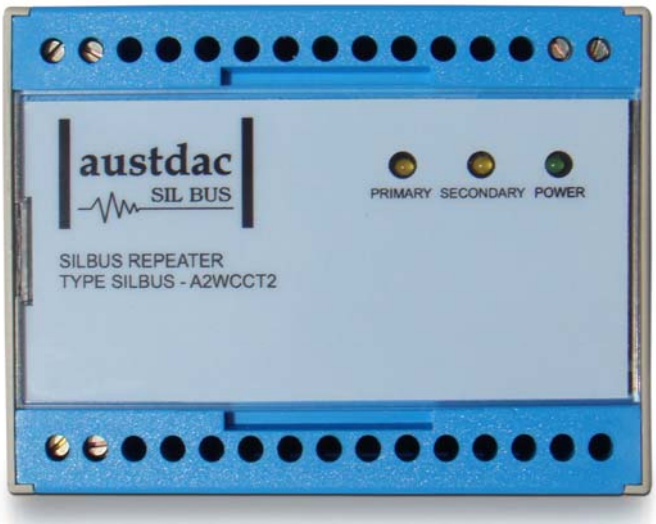
The SILBUS repeater type SILBUS-A2WCCT2 is an explosion protected DIN rail-mounting module that is used to increase the distance in a Dupline or SILBUS network. The repeater can also be used as a 'power booster' in a section of a network that has many line powered field devices connected to the network. The repeater may also be useful in attaching a long stub to a network and limiting the effects of reflections. The repeater takes the SILBUS pulse train from the primary network and reconstitutes the signal as the secondary network. The primary network contains the host controller or channel generator.

The primary and secondary ports of the repeater are electrically independent or galvanically isolated from each other. This isolation allows the SILBUS-A2WCCT2 to provide many simple and highly effective solutions when used in installations involving intrinsically safe and non-intrinsically safe SILBUS networks.

The repeater is housed within a DIN rail mounting enclosure measuring 100mm (W) x 75mm (H) x 110mm (D). The front panel is located between the two top of enclosure mounted terminal blocks to provide a clear view of the operation indicating LED's. Two yellow LED's are provided to indicate the status of the primary and secondary networks. A third LED is provided to indicate the status of the secondary network power input port.

2 FRONT PANEL LAYOUT

The repeater front panel is located between the terminal blocks that form part of the enclosure. Located in the top right hand corner of the front panel are the PRIMARY, SECONDARY and POWER status LED's. The green power LED is illuminated whenever a 12 volt supply is connected to the repeater secondary power port. The yellow primary status LED flashes to indicate the correct operation of the primary network. The yellow secondary status LED flashes to indicate the correct operation of the secondary network.



Photograph 1 SILBUS-A2WCCT2 front panel

3 TYPICAL APPLICATIONS

3.1 CONVEYOR THAT PASSES FROM A HAZARDOUS AREA TO THE SAFE AREA

Many underground coal mines have at least one conveyor belt that transitions from a hazardous area to the safe area, this conveyor is typically known as the drift belt and it brings coal from underground to the surface and up to the coal washing plant or stacker-reclaimer. About three quarters of the drift belt is underground and in the hazardous area while one quarter is above ground and in the safe area. The repeater can simplify the SILBUS belt monitoring and control system installation by splitting the system into non-intrinsically safe and intrinsically safe sections at the transition point, typically just inside the mine portal. The repeater eliminates the need for signal draining zener barriers at the transition point.

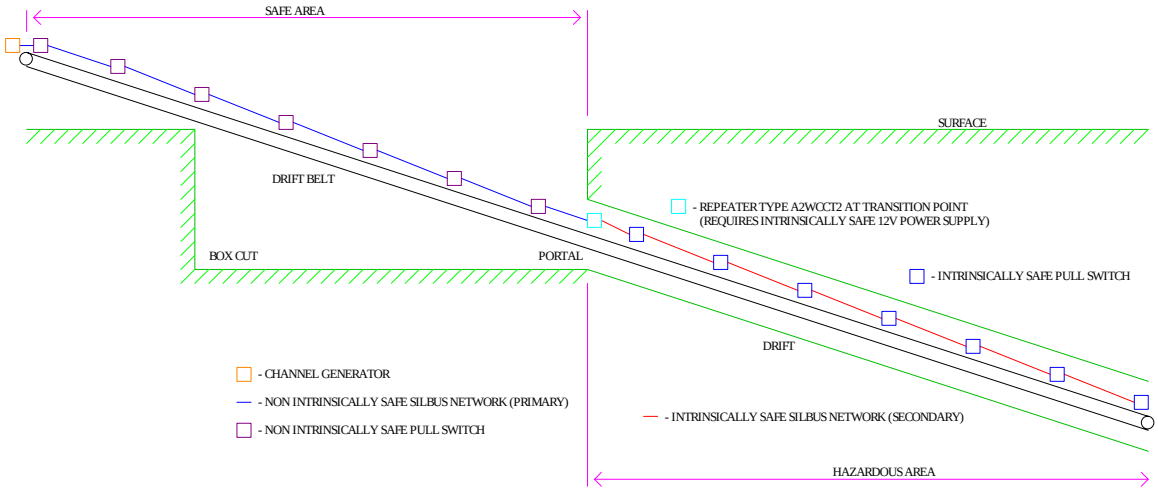


Figure 1 Typical drift belt installation

3.2 PROVIDING GALVANIC ISOLATION WITH LIGHTNING PROTECTION

The repeater type SILBUS-A2WCCT2 has inherent segregation and galvanic isolation between the primary network port and the secondary network port that is useful in filtering the effects of lightning induced surges that may be present on a primary non-intrinsically safe SILBUS network.

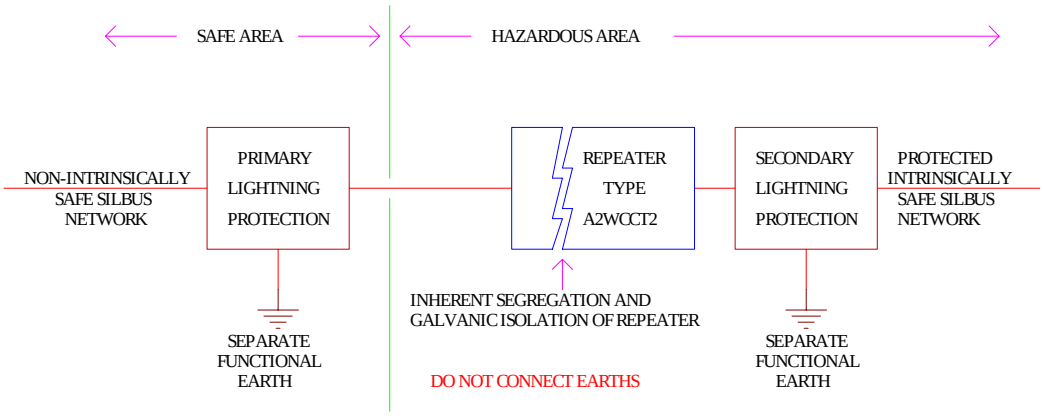


Figure 2 Galvanic isolation with lightning protection

By using the repeater in conjunction with two sets of lightning surge protection diverters, one on the primary network and one on the secondary network as shown in the figure below the effects of lightning can be virtually eliminated from the intrinsically safe secondary network.

For maximum reduction of lightning surges in the secondary network the two functional earths must not be connected directly. Always use best practice high radio frequency wiring techniques for the earth connections. Always maintain segregation and separation of the wiring of the primary and secondary SILBUS networks.

3.3 REDUCTION OF REFLECTIONS INTRODUCED BY A LARGE BRANCH OR STUB

The repeater can be useful in eliminating the effects of reflections caused by the addition of a long branch, spur or stub to a SILBUS network. By using a repeater as shown in the figure below the effects of stub generated reflections can be eliminated entirely.

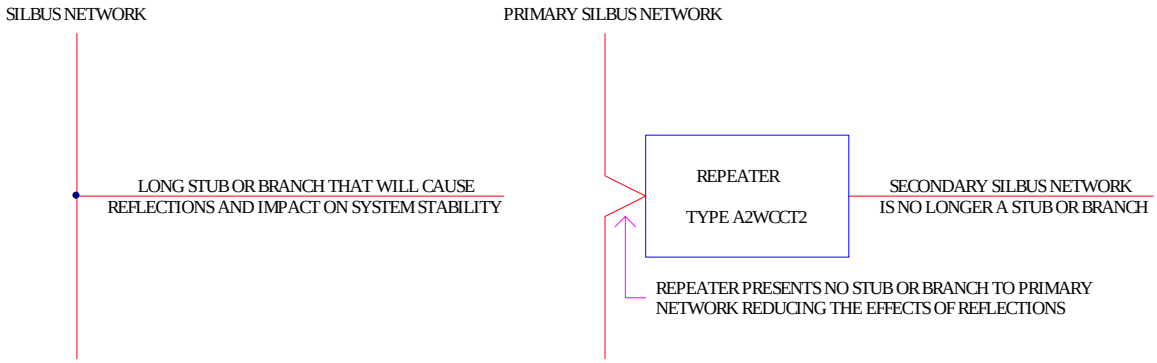

SILBUS NETWORK
PRIMARY SILBUS NETWORK
LONG STUB OR BRANCH THAT WILL CAUSE
REFLECTIONS AND IMPACT ON SYSTEM STABILITY
REPEATER
TYPE A2WCCT2
SECONDARY SILBUS NETWORK
IS NO LONGER A STUB OR BRANCH
REPEATER PRESENTS NO STUB OR BRANCH TO PRIMARY
NETWORK REDUCING THE EFFECTS OF REFLECTIONS

Figure 3 Eliminating reflections caused by a network branch

The repeater isolates the discontinuity effects of a stub, spur or branch from the primary network.

4 OPERATING INSTRUCTIONS

The repeater type SILBUS-A2WCCT2 does not require any operator action to operate once it has been installed within an IP54 host enclosure and wired correctly.

The repeater introduces a delay of one Dupline / SILBUS scan when transferring channel pulses from the secondary network to the primary network. The channel generator function of the secondary network will lock onto and follow the channel generator function of the primary SILBUS network causing channel pulses being transferred from the primary network to the secondary network to incur a maximum delay of 1mS.

The secondary SILBUS network of the repeater will take on the same number of channels (8, 16, 32, 64 or 128) as the primary SILBUS network

5 TERMINATIONS AND CONNECTIONS

All connections to the repeater are via cage-clamp terminals around the perimeter and near the front of the DIN rail mounting enclosure, these terminals can accommodate up to 4mm^2 conductors. There are 6 possible connections to the repeater; these are shown in the following tables and diagrams:

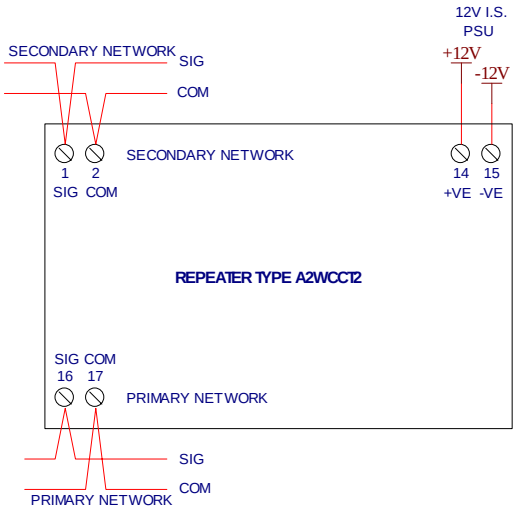


Figure 4 Repeater connection diagram

5.1 POWER INPUT PORT

The repeater operates from a nominal 12 volt DC supply. The power supply operating range is from 7.5 volts through to 12.6 volts. The SILBUS-A2WCCT2 consumes less than 26mA from the power supply. The table below shows the power input port connection details.

POWER INPUT PORT TERMINATIONS		
TERMINAL	DESIGNATION	DESCRIPTION
14	+VE 12V	POWER SUPPLY +VE INPUT
15	-VE 12V	POWER SUPPLY –VE OR COMMON INPUT

Table 1 Power input port termination details

5.2 PRIMARY SILBUS NETWORK PORT

The primary SILBUS network port provides a means for the repeater to be connected to the primary SILBUS network. Any connections to a SILBUS field bus network pair should be of a multi-drop nature with spur lengths kept to a minimum. This will minimize any reflections and therefore communications errors in the SILBUS network.

PRIMARY SILBUS NETWORK PORT TERMINATIONS		
TERMINAL	DESIGNATION	DESCRIPTION
16	SIG	SILBUS NETWORK SIGNAL
17	COM	SILBUS NETWORK COMMON

Table 2 Primary SILBUS network port termination details

The table above shows the primary SILBUS network port connections.

5.3 SECONDARY SILBUS NETWORK PORT

The secondary SILBUS network port provides a means for the repeater to be connected to the secondary SILBUS network. Any connections to a SILBUS field bus network pair should be of a multi-drop nature with spur lengths kept to a minimum. This will minimize any reflections and therefore communications errors in the SILBUS network.

SECONDARY SILBUS NETWORK PORT TERMINATIONS		
TERMINAL	DESIGNATION	DESCRIPTION
1	SIG	SILBUS NETWORK SIGNAL
2	COM	SILBUS NETWORK COMMON

Table 3 Secondary SILBUS network port termination details

The table above shows the secondary SILBUS network port connections.

6 CERTIFICATION

The repeater type SILBUS-A2WCCT2 has been awarded IECEx certification under IECEx TSA 07.0002X, Ex ia I, as part of the Dupline / SILBUS system.

The certification requires that the A2WCCT2 be mounted within a host enclosure that provides a minimum ingress protection of IP54 (IP55 for Queensland Australia).

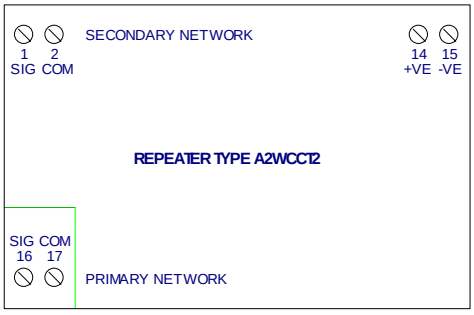


Figure 5 Repeater segregation and isolation levels

Because of the segregation and isolation between the various ports of the SILBUS-A2WCCT2 it may be used to provide isolation and segregation between non-intrinsically safe and intrinsically safe SILBUS networks without the use of signal draining zener barriers. As shown in the above figure the primary network port is isolated from the power supply and secondary network ports to IEC60079-11 375 volts as indicated by the green dotted lines. The power port and secondary network are **not** isolated from each other.

7 SOFTWARE REVISION AND DISPLAY

The software version of the repeater type SILBUS-A2WCCT2 will vary as its functionality is improved at the request of our customers. The software version is given in the format **ZPR176-n**, where ZPR176 represents the product code and n represents the revision level. E.g. ZPR176-1

The software version can be determined by reading the label on the processor chip U2 mounted on PCB0266A. The following table records the software revision history of the SILBUS-A2WCCT2 repeater.

SILBUS-RX4D SOFTWARE REVISION HISTORY		
VERSION	DATE	
ZPR176-1	2004	First production release

Table 4 Repeater software revision history

8 SPECIFICATIONS

Name ..... Repeater

Type SILBUS-A2WCCT2

Primary network port segregation IEC60079-11 375v

Primary port isolation 4kV

Terminations ..... Cage clamp 4mm^2 maximum

Size ..... 100mm (W) x 75mm (H) x 110mm (D)

Mass 260g

Fixing .....TS35 DIN rail or screw mount M4 on 85mm x 61mm centres

Ingress protection IP20

Enclosure material ..... Polycarbonate (30%GV) UL 94 V-1

Enclosure colour .....RAL 7032 Grey

Terminal material ..... Polycarbonate UL 94 V-2

Terminal block colour ..... Blue

Operating temperature range..... 0ºC to 40ºC

Storage temperature range..... -20ºC to 80ºC

Operating relative humidity range ..... 10% to 90% Non condensing

Power supply operating voltage range.....7.5v to 12.6v

Power supply current consumption..... 120mA maximum